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SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE



FEBRUARY 6, 1937

"The Waters Prevailed"

See Page 83

A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

Vol. XXXI

No. 826

The Weekly  Summary of

Current Science

Published Every Saturday by

SCIENCE SERVICE

2101 Constitution Avenue

Washington, D. C.

THE INSTITUTION FOR THE POPULARIZATION OF SCIENCE organized 1921 as a non-profit corporation, with trustees nominated by the National Academy of Sciences, the National Research Council, the American Association for the Advancement of Science, the E. W. Scripps Estate and the journalistic profession.

Edited by WATSON DAVIS

Subscription rates—\$5.00 a year postpaid; two years \$7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

Canadian subscribers please add 50 cents a year, foreign subscribers 75 cents a year to regular subscription rate to cover postage.

Members of the American Association for the Advancement of Science have the privilege of subscribing to SCIENCE NEWS LETTER at the reduced price of \$3 per year. Application for this privilege should be accompanied by privilege card obtained from the Permanent Secretary, A.A.A.S., Smithsonian Institution Building, Washington, D. C.

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Cable address: Scienservc, Washington.

Entered as second class matter at the post-office at Washington, D. C., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices.

Advertising rates furnished on application. Member Audit Bureau of Circulations.

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DO YOU KNOW?

Teeth erupt in different order in apes and in man, it is reported.

Soybean meal improves the color of bread when used in suitable proportions, by decolorizing the carotene in flour.

A study on the effects of smoky atmosphere on ultraviolet light shows that the amount of ultraviolet in the country may be 50 per cent more than in the city.

The so-called sea serpents that mystify observers when seen in waters off Southern California are probably common king-herrings, which are ribbon-like fish sometimes 30 feet long.

Tuberculosis in cattle has been reduced to less than half of one per cent in 43 states, and there is hope that the disease will be conquered in American cattle.

Efforts to find a process for removing lampblack inks from the paper in old newspapers and magazines proving unsuccessful in Germany, chemists have tried instead to compound an ink that bleaches easily and they now report success.

In Navajo Indian language a turtle is "that which is tired," a mule is "long ears," sugar is "sweet salt," and coal is "the rock that burns."

The world's largest apartment house development—a group of 1,200 flats—is reported under construction in London, overlooking the Thames.

Fresh fruits from the United States, such as grapes, apples, and pears, are being carried to interior points in Colombia by air express.

Washing automobiles in lakes and streams is causing so much protest from those who use the water for bathing or household purposes that some communities forbid it.

Crops grown on Arctic Soviet farms include turnips, carrots, beets, cabbage, wheat; and in hothouses the Arctic farms grow lettuce, onions, and tomatoes.

A naturalist reports that the many dead fish found in a stream after a nearby forest fire, were apparently killed by the ash which fell in the water and formed a toxic solution, and not by the heat from the fire.

WITH THE SCIENCES THIS WEEK

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CLIMATOLOGY-POPULATION

Population Centers Should Be Moved from Flood Zones

Cities Must Be Moved From River Bottoms;
Geologist Urges Man Not to Dispute With Nature

By DR. CHARLES P. BERKEY, Professor of Geology, Columbia University, Secretary, Geological Society of America

IN EVERY emergency arising from extraordinary display of the forces of nature, especially the destructive work of natural agents, question is raised sooner or later as to causes and the possibility of prevention.

Most popular explanations are unsound and many of the cures proposed are hopelessly inadequate. Nature is blamed for the mistakes of man. Lack of appreciation of geologic processes and failure to take note of the danger signals leads to one disaster to another year after year.

Inadequate Efforts

Special reforestation, levees and a few dams are expected to do what they have no competence for. Spoonfuls of water are impounded while lakefuls on upper reaches flood the courses of our river systems. Nature has its own way of disposing of an oversupply of rain or melting snow.

It would be immeasurably more distressing if these waters were spread out over the surface of the ground to lie there stagnant until dried up by evaporation. Gravitation compels it to flow and the gathering of this run-off forms the streams that finally on occasion build up great floods.

But they all follow the lines charted by the river itself in more orderly times when its chief work was to dig a channelled course for its own accommodation.

The plain fact is that a river has nowhere else to go. The inner channel carries the stream in normal times, but in flood the valley bottom is covered also, and in great floods even the lower terraces are reached. The point is that these lands are its own property. Anyone encroaching on these particular lands is a trespasser in yearly danger and will learn by experience, if not otherwise, that nature is still master.

Although in occasional instances spe-

cial protective measures or diversions or impoundings are partially effective, the principal move indicated by the facts is very different. We are slowly learning that some of the things we have tried to do cannot be done. Our effort by comparison is too puny. But this does not mean that there is no answer. We have found out lately that agricultural settlement of the arid plains was carried too far. Everyone now knows that some of the settlement must be abandoned.

The cure for flood disaster is essentially the same. Dangerous bottomlands should not have been occupied, of course. We know full well how they came to be and why the stricken people return to the same spot in the vain hope that such a visitation may never come again. But the time must come when better plans will be laid. Helpless populations now crowded along the river bottoms in our great cities will be provided habitations beyond the reach of

danger. Cities can even be replanned.

Instead of praying that the windows of heaven may be closed, or instead of attempting to dispute the right of way of one of nature's giants, perhaps it would show great wisdom to accept the situation and turn such portion of the river bottom as it must occupy on occasion back to the river again. Nature has provided a very demanding use for these places and apparently the thing for man to do is to observe nature's danger signs and provide other ways of meeting his own needs.

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METEOROLOGY

Real Flood Cause Lay Off the Southeast Coast

A STUBBORNLY unmoving mountain of tropical air off the southeastern coast of the United States, that would not get out of the way and permit the normal midwinter traffic of storms to flow in from the northwest, is the ultimate explanation of the nation's flood woes. Ordinarily the northwesterly storms bring real winter cold, and the cold holds most of the seasonal precipitation in storage as snow and ice until time for the spring thaws. But with this persistent southeastern "high" keeping temperatures abnormally warm ever since well back into December, there was no snow, repeated rains have kept



LANDING FIELD—WITH NO LAND IN SIGHT

Penalty is exacted without remorse or opportunity for appeal, when man thrusts his works too confidently into the path of the major forces of nature.

the soil soggy, and when a whole procession of "little lows" came marching along, dumping their moisture, there was nowhere for the water to go but off. And up came the rivers.

That, in a nutshell, is the story of the present record-breaking flood disasters, as stated by the U. S. Weather Bureau to Science Service.

The floods of the early spring of 1936 followed a somewhat similar situation, Weather Bureau scientists continued. In fact, persistent high-pressure areas in the Southeast are not unusual phenomena, though nobody knows as yet why they develop. However, as a rule they do not hang over that corner of the country for more than a few days, whereas this one has been an affair of weeks.

The present flood situation differs from that of 1936 in one important respect. Then, one single tremendous storm, deluging the upper watersheds of the rivers with downpours of as much as six inches within twenty-four hours, did all the mischief at once. The present situation has arisen from a whole procession of lesser storm areas, none of which has brought more than an inch, but all cumulating into a terrific aggregate of water.

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SOIL CONSERVATION

Flood Storm Carried Off 300,000,000 Tons of Soil

LOSSES of best farm soil during the present flood period reach almost astronomic figures, according to calculations of the U. S. Soil Conservation Service. From the Ohio watershed, where most of the rains fell, it is figured that the prolonged storm period carried away three hundred million tons of topsoil at a very conservative estimate. The very fact that the rain has been long drawn out, indeed, operated toward making the losses less; the same amount of precipitation concentrated into a shorter time would have washed away an even greater mass of soil. Even as it is, gullying has been exceedingly rapid.

Careful measurements were made by the Soil Conservation Service of the run-off from certain fields in Ohio. From plowed land the run-off has been eight inches for the period of the rains; from comparable areas under grass and trees the run-off has been only two inches. Soil losses from the plowed land were of course several times as great as from the protected soil.

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ECOLOGY

Half-Hearted Measures Won't Succeed for Flood Control

By PROF. PAUL B. SEARS, University of Oklahoma

LANDSCAPE architecture on an imperial scale is our problem now.

Modern civilization must design its own landscape no less than its cities if it is to survive.

Because the disaster of flood is so ghastly and spectacular it is regarded as the disease itself, whereas it is but a symptom. The location of the worst suffering is not at the actual seat of trouble, yet much so-called flood control has been confined to downstream areas. This is not quite so sensible as treating appendicitis with pain killer.

The general principles of preventing flood damage are well understood, but great need remains for fundamental studies on climate and soil, and particularly the social sciences. The problem is really one in human ecology.

Any thorough plan of upstream engineering is headed for trouble with conflicting special interests. Moreover, such engineering alone is not adequate. The entire landscape must be reorganized. The average engineer works with great biological and social forces he has not been trained to interpret.

I agree with the statement credited to Colonel Younghusband, famous British explorer, that only two kinds of landscape are tolerable: one where man has made no change, the other where he has complete control as in western Europe.

The latter has been largely reconstructed and a working balance established following the chaos of early exploitation. The same must be done here. The white race is on this continent with both feet and must see it through. We can not restore original conditions except in limited areas and even to do so would not end floods or other symptoms of diseased environment.

Land use, highways, water supply, soil conservation, forestry, grazing, recreation, and flood control are merely facets of the major problem of creating a new landscape adjusted to the modern culture pattern. This is too vital a matter to be left any longer to chance. Industry, finance, agriculture, and science should cooperate to the limit with the Government instead of waiting to be pushed. The problem is bigger than any group of interests for it concerns the physical framework of civilization on this continent.

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TOO MUCH EVEN FOR MUDLARKS

Some racehorses are handicapped by a wet track. Here is one of the country's finest racecourses, near Louisville, Ky., too wet for anything but seahorses.

PUBLIC HEALTH

Doctors Advise Iodine To Make Water Safe

PERSONS living in or traveling to flood areas where the water supply may be polluted temporarily can assure themselves of a safe drink of water by adding a drop of iodine to each glass of water. The ordinary tincture of iodine for first aid treatment of cuts does the trick of destroying typhoid fever or other harmful germs. A drop will make as much as a quart of water safe for drinking. Persons traveling can carry with them the little ampules made for first aid use.

The value of iodine for this purpose was discovered by Maj. A. P. Hitchens of the U. S. Army Medical School.

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PUBLIC HEALTH

"Nor Any Drop To Drink" But Clean-Up Job To Do

WATER, by world-old tradition the foe at once of thirst and fire and dirt, becomes paradoxically their ally when it goes on a rampage as in the present great flood. So we have been treated to the amazing spectacles of firemen unable to put out conflagrations because they were hampered by water, of the sanitary authorities of at least one great city forbidding all bathing, of public health officers begging people to abstain from the dangerous practice of drinking water.

The latter two situations have a common cause in the further paradox that of all organisms dangerous to mankind the most dangerous is man. In and about his body he carries the germs of his own undoing—particularly those that invade through the digestive tract, and through chance abrasions and wounds. Typhoid, the various dysenteries, blood-poisonings and infections—these are only a part of his constant suicidal equipment.

Normally man uses water copiously as his means of washing away from himself the overplus of his own uncleanness. His water sources are as well protected as possible by clean selection, by filtering, by chlorination. His drainage systems are designed for rapid clearance.

But water on anarchic rampage swirls up all his noxious refuse, dumps it into his clean-water reservoirs, leaves it in his houses and cellars, pollutes his milk depots with it. So after a flood man has a rather terrific cleaning-up job to do—and he must do it in a tearing hurry,

yet thoroughly too, because the penalty for neglect or slackness is so swift and severe. Quicklime for the cellars, chloride of lime for the rooms of the houses, drainage of reservoirs and renovation of their filter beds, clean-pumping of wells and their chlorination and re-emptying, these are among the many routine things that must be taken care of as soon as the waters recede. They will provide plenty of work for those who need employment, though of course for a great part of the work public funds will have to be provided. In the meantime, public

METEOROLOGY

Weather Bureau Plans For Better Flood Forecasting

EVEN as the enormous resources of the Federal government, in money and personnel, pour into the stricken flood area government officials are planning ahead and studying ways to mitigate the harm on that future date when floods again return.

In particular a plan for a better river and flood service for the U. S. Weather Bureau—first set up in the fall of 1935 and already used in a small way—should come in for most careful consideration. It can be recommended, for example, to those Senators and Congressmen from the states along the Ohio River who are now banding together for adequate protection to their home territory.

One of the few presentations of the new flood forecasting plan of Dr. Willis Gregg, chief of the U. S. Weather Bureau in Washington, was given, almost unnoted, last fall by Montrose W. Hayes, then in charge of the River and Flood Division of the Bureau. Within a month after telling the American Society of Civil Engineers at their Pittsburgh meeting about the plan Mr. Hayes died in Washington. Before his death, however, Mr. Hayes personally sent Science Service a copy of his address from which the following material is edited.

Flood forecasting, said Mr. Hayes, falls into two categories: (1) forecasting by gage readings and discharge rates, and (2) forecasting from reports of rain fallen or expected to fall. Gage readings are the oldest method and attain good accuracy when used on a large river far from the headwaters. Forecasts of two or three days can be made in upper valleys and forecasts of three or

health officers plead and insist that no one in a flooded district shall drink unsterilized water.

Observance of these and other sanitary precautions enabled the country to get past the critical post-flood period in 1936 with a low disease incidence consonant with its position as a civilized nation, and it is hoped that as good a record may be maintained when the subsidence of the present deluge leaves us to confront the rising of the new danger.

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four weeks on the lower Mississippi River with the method.

In regions where numerous small streams flow the channels are too numerous to make gage measurements possible and rainfall measurements must be resorted to. In particular, pointed out Mr. Hayes, flood forecasts east of the Appalachian Mountains are of little value unless made by rainfall measurements.

"The standard of refinement of flood forecasts," declared Mr. Hayes, "is set by those who use the forecasts. This statement may cause some surprise, but its truth can be shown with ease. If the interests along a river can be protected by two-day forecasts verified in stage with an accuracy of about 2 feet it would be useless to spend the money necessary to provide three-day forecasts with an order of accuracy of less than half a foot. Upon the other hand if the latter and more accurate forecasts were needed, an effort would be made to find the money with which to make them possible. Owing to the unprecedented heights of the floods of March, 1936, when, in inundated cities, each 6 inches of rise meant an additional loss of enormous extent, the Weather Bureau now finds itself facing unprecedentedly widespread demands for river stage and flood forecasts of longer range, and of greater refinement as to stage verification, and in providing them many obstacles will have to be overcome.

"Changes in the present plan of operation will be necessary, and some outstanding deficiencies must be met. Some are simple and need not be mentioned. Others that are rather complex or difficult of attainment, but are essential to a river forecasting service of

a high order of accuracy, are brought to your attention as an explanation of why the Bureau can not immediately strengthen its river service to the extent known to be desirable. They are as follows:

"(1) The establishment of more and better placed rainfall stations, especially in head-water regions.

"(2) The installation of an adequate network of recording rain gages to enable the forecaster to know the intensity of the rainfall.

"(3) Surveys of the amount and condition of snow in the eastern mountains, from which little information concerning snow is now available. Reliable and prompt rainfall reports are not sufficient when the mountain regions hold a great amount of water in the form of snow, which is likely to be released by the rain.

"(4) Arrangements for a more reliable transmission of rainfall and river stage reports from the substations to the district centers. Except in very unusual cases the telephone and telegraph wires answer all purposes with a great degree of satisfaction, but in the unusual cases, which are emergencies, the greatest need for the reports exists, and a river forecaster without information from the drainage area above him is helpless. The problem is difficult to solve.

Cooperating "Hams"

"It has been suggested that radio stations should be established in the flood producing regions, manned by Weather Bureau employees, to transmit reports promptly under all conditions to the forecasting center. This would be a solution, but it is felt that the cost would not be justifiable; certainly it would not be until it could be shown definitely that the Weather Bureau had exhausted every other and less costly means for having reports transmitted satisfactorily. One plan proposed and being investigated is to have an arrangement under which amateur radio operators would transmit reports in times of emergencies.

"(5) Divide the country into eight sections for river administrative and forecasting purposes. Have a staff of men in each section to handle the river work. These men should be charged with placing and supervising the operation of the substations, the transmission of reports to the forecasting centers, with coordinating all phases of the work, with investigating the requirements for forecasts and arranging for meeting the requirements, with cooperation with other organizations engaged in river work, and with developing formulas for forecasting. Through a

close cooperation with the Geological Survey, discharge data are becoming available to the Weather Bureau for all of the rivers of the country, and these data can be used to a great advantage, in combination with Weather Bureau data, in the development of formulas that will enable considerable refinement to be introduced into the river stage and flood forecasts.

"The foregoing list of requirements for a river forecasting service of a high

CLIMATOLOGY

Great Floods on Great Rivers Encountered by Explorers

GREAT floods on America's great rivers are no new thing under the sun. They are recorded by the earliest Spanish explorers, who found that the Indians had adapted themselves to the flood problem by building great mounds as artificial hills of refuge for emergencies.

The chronicle of the expedition of Hernando de Soto, who discovered the Mississippi, tells of a terrific flood on the lower river, near Memphis, which lasted from mid-March until the end of May, in the year 1543. De Soto and his men had landed at Tampa Bay, Florida, traversed the states of Florida, Georgia, the Carolinas, and Alabama. Then they discovered and crossed the Mississippi, which De Soto called the Great River. After exploring Arkansas and Louisiana, the Spaniards again came back to the Great River, where their leader fell sick and died and was buried in its waters so that hostile Indians might not find and dishonor his body.

It was during their sojourn on the river that they were given the first view of a Mississippi flood that white men's eyes had ever beheld. Here is how the chronicler, Garcilaso de la Vega, was impressed:

"Then God, our Lord, hindered the work with a mighty flood of the Great River, which, at that time—about the eighth or tenth of March—began to come down with an enormous increase of water; which in the beginning overflowed the wide level ground between the river and the cliffs; then little by little it rose to the top of the cliffs. Soon it began to flow over the fields in an immense flood, and as the land was level without any hills there was nothing to stop the inundation.

order of accuracy is not merely something to be desired and not attained. Upon the contrary, it represents a plan set up by the Chief of the Weather Bureau more than a year ago, and a modest beginning toward its accomplishment was made on July 1 of this year. Small staffs have been placed both in the Missouri Valley and the upper Mississippi Valley, and other parts of the country will be taken care of as it becomes possible to do so."

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"On the 18th of March of 1543, which that year was Palm Sunday, when the Spaniards were marching in procession the river entered with ferocity through the gates of the town of Aminoya, and two days later they were unable to go through the streets except in canoes.

"The flood was 40 days in reaching its greatest height, which was the 20th of April, and it was a beautiful thing to look upon the sea where there had been fields, for on each side of the river the water extended over twenty leagues of land and all of this area was navigated by canoes, and nothing was seen but the tops of the tallest trees.

"On account of these inundations of the river the people build their houses on the high land, and where there is none, they raise mounds by hand, especially for the houses of the chiefs; the houses are constructed three or four stages above the ground, on thick posts that serve as uprights and between uprights they lay beams for the floors, and above these floors which are of wood, they make the roof, with galleries around the four sides of the house where they store their food and other supplies, and here they take refuge from the great floods.

"The floods do not occur every year, but when in the regions where the rivers have their source there have been heavy snows the preceding winter with rains in the following spring; and thus the flood of that year of 1543 was very great on account of the heavy snow which had fallen the preceding winter. These floods occur every 14 years, according to what an old Indian woman told us."

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ASTRONOMY

Bending of Light May Help Scientists Find Remote Objects

RUDI W. Mandl, the mathematically-minded Czechoslovakian dishwasher of New York City, apparently has started something. It is now revealed that his suggestions may enable astronomers to detect objects farther away than the present observing limits of their telescopes. Mandl, it will be recalled, had his brief moment of fame recently when Prof. Albert Einstein published calculations based on his ideas.

Scientists at California Institute of Technology and Mt. Wilson Observatory are wondering if Mandl's basic idea may not provide astronomy with a gravitational telescope, composed of stars, for studying distant nebulae beyond the reach of all man-made telescopes no matter how powerful they may be now, or however powerful they may ever be made at any time in the future.

Mandl, to recall a few facts, asked Prof. Einstein to check through mathematical calculations, and publish the result, on the idea that light rays from a distant star should be bent and gathered into a telescopic effect as they passed by some nearer star. Mandl hoped that an additional ring of light would thus be formed about the nearer star and that this would provide a test for the theory of relativity.

Easy for Einstein

The problem was a fairly simple mathematical exercise for Einstein but unfortunately for Mandl's hopes the effect, said the famous relativist, was principally of academic interest since little hope could be held that the phenomenon might be observed.

But at the seminar discussions at the California Institute of Technology and Mt. Wilson, Mandl's idea has not died and, in fact, holds promise of aiding astronomy in a way he perhaps did not foresee. As a matter of fact for nearly a year now Dr. Fritz Zwicky of the Institute has been making calculations on the same happening with distant nebulae instead of single stars. Rudi Mandl, it seems, talked to other people before he was able to get to see Prof. Einstein. Among others he talked to the famous television engineer, Dr. V. K. Zworykin of the Radio Corporation of America. And Dr. Zworykin told Dr. Zwicky about it.

Dr. Zwicky has calculated, and will soon publish in the technical journals of science, that if a nebula has more than 10,000,000,000 stars in it and were not too diffuse its gravitational field should be so powerful that light from a still more distant nebula would be bent slightly in passing by it.

If the earth happened to be in line with the two nebular systems it might be found that the nearer one, instead of hiding the more distant one, would gather the rays and bend them into the instruments of an observer on the earth. A star-studded gravitational telescope with a focal length of millions upon millions of miles would thus be achieved.

The effect seen on earth should show the nearer nebula with a ring of light around it. If the earth and the two nebulae were not exactly in a straight

line the ring of light would not be uniform and might even appear as two spots of light on opposite sides of the nearer nebula.

A fortuitous peculiarity of the phenomenon is that the more distant is the farther nebula, the more helpful is the nearer one in brightening it. Calculations indicate that the gain in light brightness may be as much as several hundredfold. In this way it may be possible to study objects far too distant for the most powerful telescopes to see directly. And even though still more telescopes were built the same situation would still be true.

The size of the universe, the behavior of the red shift of light at these enormous distances and the masses of the nebulae themselves are only a few major problems which could be studied by the new technique.

If Dr. Zwicky's former estimates of the mass of the nebulae are correct, Mt. Wilson astronomers should soon find an example of the ring of light which he predicts about an occasional nebula. And no one would like that better than one Rudi Mandl.

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AID STUDY OF NEBULAE

With the aid of such "nearby" nebulae as that of Andromeda, shown above at a distance of about 1,000,000 light years, scientists are hoping to study still more distant nebulae which are now beyond the range of the largest telescopes. In the insets: Prof. Albert Einstein, top, published calculations of dishwasher Rudi Mandl of New York, left, showing that theoretically the light from a distant star should be focused as it passed a nearer star. Prof. Fritz Zwicky of California Institute of Technology, right, learned of Mandl's idea from Dr. V. K. Zworykin of RCA, bottom, and has applied the calculations to a similar effect for distant nebulae.

PUBLIC HEALTH

**Influenza Cases Jump;
Flood May Bring Still More**

A BIG jump in influenza cases that was not due to the disastrous Ohio River floods has been reported by state health officers to the U. S. Public Health Service. The increase, to a total of 35,953 new cases, was reported for the week ending Jan. 23. Western states showed largest numbers of cases per state.

Since that date hundreds of thousands have been driven by the flood from their homes and following exposure to cold and wet are now crowded together in temporary and makeshift living quarters. It looks like a perfect set-up for another big jump in influenza cases. Reporting of influenza cases is sketchy at best and under present circumstances reports will probably lag farther than ever behind the actual number of cases.

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ENTOMOLOGY

**Black Widow Spider Bad?
Pooh! Keep in Woodpile!**

B LACK widow spiders deadly? Dangerous to have around the premises?

Dr. H. A. Allard, scientist in the U.S. Department of Agriculture, pooh-poohs the whole idea. (*Science*, Jan. 15.)

Black widows are poisonous; that he does not dispute. They can make you sick if they bite. The joker is, they almost never bite.

Years ago, says Dr. Allard, he found the spider very abundant in northern Georgia. Doubting its poisonousness and willing to play guinea pig himself, he tried to make it bite him on the thin skin between his fingers. The obstinate arachnid would not bite.

"On collecting trips as many as five or six were carried in the closed hand on several occasions with no effort on their part to bite," Dr. Allard continues. "The writer has liberated swarms of the young in an old woodpile near his garden, with no fear of being bitten. Much has been written within recent years about the evil ways of this spider, but there is little reason to fear its attacks and no reason to wish that it could be exterminated."

Black widows apparently have the strongly developed maternal instincts often attributed to their human namesakes. At any rate Dr. Allard states

that they will adopt the cocoons containing the spiderlings of other females of their species. "If one is dropped on the floor of a box with a female she proceeds to suspend it in a web and watch over it. The process is repeated if others are dropped about, showing a rather marked solicitude for the nest."

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TECHNOLOGY

**New Patented Device Tells
Smoothness of Paper**

H OW smooth is a piece of paper? Seems simple, doesn't it, when you contrast the feel of a glossy magazine such as the *SCIENCE NEWS LETTER* with the rough coarseness of the so-called "pulp."

But your finger will not be sufficient if you are a printer and have to choose the proper ink. To give a definite numerical basis for paper smoothness a device has just been patented (No. 2,050,486) by M. N. Davis and H. E. Malmstrom of Appleton, Wis.

A photoelectric cell, glass prisms and plates, a small hydraulic press and a light beam projector are essentials of the device which utilizes well-known principles of optics.

One of the best known feats of the science of optics is to bend light around corners with internal reflection in prisms. High-grade compact field glass and submarine periscopes are only two of many devices which use this well-known phenomenon.

If, however, a piece of paper is pressed against the back face of the prism which reflects the light, some of the light is not reflected but passes out of the prism and is lost. The degree of reflection depends on how good is the contact between the prism face and the paper. Good contact, great reflection loss; poor contact, little light loss.

In the new patent a beam of light enters the prism, strikes the two back faces in succession and is caught by the photocell and turned into electrical current which can be measured. The smoothness of the paper sample under test is determined if it is pressed against the back face and reduces the light intensity coming out.

Smooth papers make good contact and greatly lower the intensity, while rough coarse papers cannot make as good contact and dim the light less. The amount of electrical current generated in each case is thus a measure of the smoothness of the two papers.

Science News Letter, February 6, 1937

IN SCIENCE

PLANT PATHOLOGY

**Natural Acid May Replace
Poisons as Fungicides**

A RSENIC, lead, copper and other mineral poisons now used to protect plants against fungus, bacterial, and insect enemies may find practicable and harmless replacement in an acid naturally formed by living plants, suggests Maurice Copisarow, Manchester, England, biologist (*Science*, Jan. 30).

The substance is known as maleic acid. Experiments have shown that it exercises an inhibitory effect on the growth of microorganisms of decay, and Mr. Copisarow suggests that its effects may extend also to viruses hidden in dormant seeds and to insects in early stages of development. This same natural inhibitor, he adds, is probably transformed into the natural accelerator of fruit ripening, ethylene.

Maleic acid may be applied as a spray in some suitable neutral oily medium, Mr. Copisarow suggests. Unlike the mineral poisons commonly used for plant protection, maleic acid can be eaten by human beings without harm.

Spray residues of mineral poisons used against fungi and insects have in the past caused considerable controversy and some legislation adversely affecting the commercial fruit industry.

Science News Letter, February 6, 1937

BIOLOGY

**Pigs Is Still Pigs,
Medical Scientists Find**

T HE modern scientific version of the famous "Pigs is Pigs" story was revealed in the medical report on "Silicosis and Allied Disorders" made public by the Air Hygiene Foundation of Pittsburgh. Scientists wished to study the effect of coal dust on animal lungs and sent a cage of 25 guinea pigs into a West Virginia coal mine. The orders were to keep them two years and then return them for tests. The animals ultimately returned in their cage but Mother Nature was left out of the calculations. Now the scientists are wondering which were the original 25.

Science News Letter, February 6, 1937

NE FIELDS

SEISMOLOGY

Earthquake Under Remote South Seas

A SEVERE earthquake shook the bottom of the far South Seas on Monday, Jan. 25, at 1:34 a. m., Eastern Standard Time. The epicenter, as worked out by the U. S. Coast and Geodetic Survey from data collected telegraphically by Science Service, was in approximately 12 degrees south latitude, 164 degrees east longitude, near the Solomon Islands.

Observatories reporting to Science Service were those of Pennsylvania State College, Canisius College, Fordham University, Weston College, the Seismological Laboratory at Pasadena, Calif., the stations of the U. S. Coast and Geodetic Survey at Ukiah, Calif., and Tucson, Ariz., the Manila, P. I., Observatory, the Zikawei Observatory near Shanghai, and the Dominion Meteorological Observatory at Victoria, B. C.

Science News Letter, February 6, 1937

ANTHROPOLOGY

Peking Man's Portrait May Soon Be Known

THE face of Peking Man, vanished from earth nearly a million years ago, will be seen again.

Discovery of a new skull of this most ancient Asiatic provides science, for the first time, with material showing the eye socket, nose bones, and certain other parts of the head heretofore unknown.

The skull, pronounced the most complete specimen yet unearthed, was found in the now famous cave of Choukoutien, near Peiping, China. Since the first discovery of Peking Man, no less than 24 individuals have been found in the cave, but always in crushed and very incomplete state. A series of discoveries within recent months has brought to light five skulls, including the latest and most enlightening example. The discoveries which offer new hope of reconstructing the features of Peking Man are being studied at Peiping Union Medical College by Prof. F. Weidenreich.

An appeal has been issued to scien-

tific workers to withhold judgment on the place in human history that this ancient Asiatic type deserves, until Prof. Weidenreich can make his report. Inaccurate rumors have already arisen, declares W. C. Pei, Chinese geologist, in a communication to the British journal *Nature*. The last three skull discoveries are erroneously being called exactly like remains of Java Man, or Pithecanthropus, which is usually classified as the earliest of all specimens of man. Another false rumor, according to Mr. Pei, is that the discoveries reveal Peking Man to be identical with Neandertal Man, an extinct form who thrived in Europe some 75,000 years ago.

Science News Letter, February 6, 1937

ORNITHOLOGY

Pointedness of Murre's Egg Helps Species To Survive

MURRES, which are birds that haunt seacoast cliffs, lay eggs so pointed they are almost top-shaped. A double usefulness for this extreme shape in the murre's extreme habitat has been discovered by Prof. R. A. Johnson of the State Normal School at Oneota, N. Y.

First, since the eggs are laid on practically bare rock, they are liable to roll. Since they come down to a point at one end, they roll in a narrow circle rather than a more open course which would take them over the edge of the cliff where the murre's nest.

The second advantage lies in the fact that the parent bird straddles the egg with the narrow end pointed backward. This fits the egg closely against the body all the way, so that it is warmed uniformly from end to end, and thus better incubated than a conventionally shaped egg would be.

Mama Murre is "spelled off" by Papa Murre in the job of sitting on the egg, Prof. Johnson found. There do not seem to be regular hours for either of the parents, however. One relieves the other whenever he (or she) happens to feel that way, apparently.

The young murre's learn to swim before they learn to fly—before the stiff flying-feathers on their wings are fully developed, in fact. Hatched on narrow shelves down the face of a towering cliff, they scramble around until they just fall off. If they drop a few score feet onto another rocky ledge, it is just a case of another young murre wasted. But if, with better luck, they plop into the sea—well, they swim. They've got to.

Science News Letter, February 6, 1937

ENGINEERING

Air Conditioning of Home Admitted To Be Luxury

PARTLY in scientific sessions but mostly in corridor discussion, scientists of the American Society of Heating and Ventilating Engineers meeting at St. Louis took home air conditioning apart and described the present trends that partially answer that much-posed question, "When shall we have cheap home air conditioning?"

Admittedly home air conditioning by mechanical refrigeration is luxury, revealed the engineers in their more anonymous and unguarded moments. For a few years it may remain so. But already simple, less costly forms of ventilating engineering are coming into wide use. These will so demonstrate their usefulness that true air conditioning is not too far away in time or price.

Growing in use are the forced air heating systems through small ducts which distribute cleaned, heated and moisture-controlled air throughout a home. When the owner wishes, it is not too difficult to tap into his system and add refrigeration.

But even at the moment the blower systems permit of pleasing cooling by sucking in the cooler night air and by forcing out the heated air of such places as the attic. Another discovery is that in summer the window shades or blinds of the Venetian type are much more effective in keeping out heat when they are placed outside of the windows rather than on the inside.

Looking to the day when the modern flat-roof type of home will be generally prevalent, heating engineers are already studying experimental homes which have about two or three inches of water on the roof. In winter this water freezes and adds a layer of heat-insulating ice to the normal roof thickness. In this point the engineers are simply stealing an idea which Mother Nature has long used to protect plants with a covering of snow and ice. In summer this water-covered roof would be the spray system with which the air conditioning unit would be cooled.

Along with these newer ideas are the old standby problems of better house construction to conserve heat in winter and keep the interior cool in summer. Most present day homes, it is generally agreed, are about as leaky as sieves to winds even though they may be watertight and keep out the rain.

Science News Letter, February 6, 1937

PHYSIOLOGY-PSYCHOLOGY

Cockeyed Art

More Than Just a Figure of Speech—Bizarre Art May Result From Visual Defects Which Distort Things Seen

By JANE STAFFORD

DID you ever come away from an exhibit of modern paintings with the feeling that the artist must be cockeyed to make such queer-looking pictures?

If you did, you are not far from being right about it. The strange colors, distorted figures and queer impressionistic effects of modern paintings are due in many cases to defects in the eyesight of the artists, in the opinion of a Los Angeles eye physician, Dr. Lloyd A. Mills.

Dr. Mills does not think the artists are cockeyed, but he claims that such visual defects as nearsightedness and astigmatism account for what the average man considers queer in modern art. Dr. Mills gives this explanation of the vagaries of modern art in a report to fellow eye physicians in the *Archives of Ophthalmology*.

Visual defects, he thinks, may also have been responsible for much that is great in modern art and were perhaps a factor in the founding of the modern school of impressionistic art.

Peripheral Vision

Persons with defective vision, Dr. Mills points out, depend much more on side vision than on central vision. As you know, the things you see out of the sides of your eyes are not very distinct. Nearsighted persons who do not wear glasses to correct the defect see very clearly objects within a short distance from their eyes. Beyond that point, which eye physicians call the far point, they cannot see distinctly, and the vision they use is side vision. Peripheral vision is its technical name.

With this type of vision, details are lost, Dr. Mills explains. Essential lines and shapes are relatively more striking but objects generally are blurred. Colors, especially blue, are not seen correctly. A considerable percentage of painters have this type of vision, Dr. Mills states. This is only to be expected, since few persons who use their eyes to such extremes as artists do escape some visual defect.

If you recall some of the modern art you have looked at, you can see how well Dr. Mills' explanation fits the pictures.

Truly great art, according to this Los Angeles eye physician, depends on the proper use of both side and central vision. When you look at a man plowing a field, you see the man and the plow distinctly (with central vision) but the edges of the field, the sky and any surrounding trees (seen with side vision) are not too distinct, though you have an impression of them. Artists a generation or so ago in painting that scene would have put on their canvases every detail not only of the plowman's face and costume but of the entire scene, so that you could see every leaf on the trees at the edge of the field and every stone the plow had turned up.

With Side Vision Only

Modern artists of the impressionist school paint the whole scene as it appears when viewed with side vision only. The first type of painting is known as photographic, and while it has its place, especially in decoration or for historic purposes, it is never, Dr. Mills says, optically correct, even when pleasing. Impressionism, when carried to an extreme, results in pictures that seem queer and all wrong to most of us.

How an artist with a certain rather common type of visual defect cannot help painting these queer-looking pictures becomes clear when you read Dr. Mills' description of how things look to him when he takes off his eyeglasses.

He has himself compound nearsighted astigmatism. If you happen to have this type of visual defect you might try a similar experiment. The far point for Dr. Mills' eyes, beyond which vision ceases to be clear when he leaves off his glasses, is only about six inches. Within this range, he says, he can appreciate detail that is so fine as to be almost microscopic.

"Beyond this, and especially over 20 feet (6 meters), objects become greatly blurred and colors run together with curious blends and unusual, washed-out

values. There is definite oblique distortion at far distances, differing in the two eyes, and often only the essential lines of form and contour provide the clues for identification of the object under examination."

All this, of course, refers to how he sees things without his eyeglasses, as does the following description:

"At the symphony concerts my seat is in about the center of the pit, nearly 70 feet from the stage. Three points of attention fix my interest at once: the tall form of the leader in the center, attenuated like an El Greco drawing, two golden harps on the left flank, and a strong white reflection from the curved, glistening, light-brown barrel of the bass drum, all striving for attention.

"Gourds on the Bias"

"The director holds the center of interest, gyrating in strange contortions like some fearful wizard before a medley of misshapen geometric patterns in blacks, grays, whites, brown and gold; there are no details anywhere, merely blurred outlines of color, form, light and movement. The cellos, on the right, appear like enormous yellow-brown gourds placed on the bias; the hands of the cellists form curious patterns, the bowing hand being a yellowish disk weaving in and out, while the hand which waves over the frets plays up and down at a wholly different angle of inclination.

"The white shirts of the drummer and of the two men on the extreme flank of the bass viols appear as blots of white and other shirts as vertical slits. The faces of the players of the stringed instruments form a veritable flower pattern, like great nodding daisies, in whites and yellow-browns; the bowing hands weave up and down as yellowish disks. The black clothes of the conductor and of the row of men next to the audience, that is, the men farthest from the strong overhead illumination, are jet-black, while the identical apparel of the rest of the musicians, directly under the lights, is gray-black, the contrast being sharp.

"When the harps are seen with one eye and then with the other eye, there is a prompt change in the angle of their inclination from the vertical, which represents the difference in slant given by the different degrees of astigmatism



AS THE MIND SEES

Organic disease of the brain can affect the eyesight in a number of ways as well as unbalancing the mind and it was probably, Dr. Mills says, "a large if not the chief factor in creating the picturized eccentricities of Van Gogh and Gauguin." This painting of the Public Gardens at Arles is by Van Gogh whose life as well as his artistic work was seriously affected by a mental disorder.

in the two eyes. The same change is noted in the size, shape and slant of the cellos and in the hands and faces. The vision of a single eye is much less distinct and brilliant, as is always the case, than the combined vision, and distortion of objects is much more apparent with one eye than with the two eyes.

"If I were a painter," Dr. Mills concludes, "and could depict this orchestra exactly as it is seen with uncorrected vision, my place in the forefront of truly impressionistic art would be unchallenged."

One or two degrees of nearsightedness, however, does not seriously handicap a person, Dr. Mills goes on to say. It may, on the contrary, have the advantage of focusing the eye perfectly at a comfortable range for painting or reading. Probably many artists do not even realize that they are somewhat nearsighted because of the comfort this slight defect gives them at ranges for working. Their nearsightedness can only be told by noting in their paintings their uniform use of side vision with what Dr. Mills calls "its apparitional and rarefied graces."

Dr. Mills' attention was first drawn to the effect of visual defect on the artist's work when he became interested in an artist who had compound nearsighted astigmatism. This man had a sprightly sense of color and shape but

"created curious distortion of details such as too long hands and enlarged knuckles." These points suggested imperfections in his vision, which were proved in examination of his eyes.

When he put on glasses that gave him correct vision, he saw at once the distortions in his paintings. He complained, however, that the unaccustomed clarity with which he saw color and detail made him lose the effects of masses of color and of the essential lines of contour and form which are more marked when vision is blurred. He was never able to paint in his established style, Dr. Mills reports, when wearing his glasses.

The visual defects of many artists are a matter of record. Cezanne, for example, was quite nearsighted and as a result most of his paintings are out of focus, and his interpretation of color, form and mass, Dr. Mills says, is wholly that of distorted side vision, with much of the color defects that results from nearsightedness. Cezanne struggled over his paintings and was never wholly satisfied with them. He abandoned one portrait, after 115 sittings, and complained that "the contour keeps slipping away from me."

Added to this Cezanne suffered from mental and nervous ails which affected the way he worked.

Another great artist who probably

was nearsighted was Renoir. While no direct record of examination of his eyes is known, remarks he made give the clues. He wore no glasses but at the age of 64 spoke of liking to walk close to a picture to study the details. At the age of 64, no person with normal or far sight can appreciate, much less study, details at close distances without glasses, Dr. Mills comments. Only shortsighted eyes can do this without strain. This shortsightedness is probably the reason for the lovely use of color and sunlight for which Renoir's paintings are noted.

Degas, famous for paintings and drawings of ballet girls, was extremely nearsighted and wore heavy glasses throughout his adult life. This nearsightedness probably is responsible for the famous pictures of dancing girls, for Dr. Mills points out that it was through the use of side vision—result of the nearsightedness—that Degas was able to depict the grace and movement of the dance in his unsurpassed fashion.

The modern impressionistic style of painting stage settings is, in Dr. Mills' opinion, owing to the fact that Gordon Craig, who started it all, was extremely nearsighted. Isadora Duncan writes that he could not distinguish her in detail across their breakfast table. This man's visual defect has given the world Reinhardt, Jacques, Copeau and Stanislavsky and taken stage settings out of the period of "the old realistic scenery, every leaf shimmering on every tree and all the houses with all their doors and windows opening and shutting."

Sargent's Red Line

Another modern artist whose paintings may seem queer to you is Pissarro. He suffered from repeated ulcers on the cornea of his eyes. These ulcers and their scars were a constant source of worry and eyestrain.

If you are familiar with the work of John Singer Sargent you will remember that he often painted a red or green line around white objects. Because he

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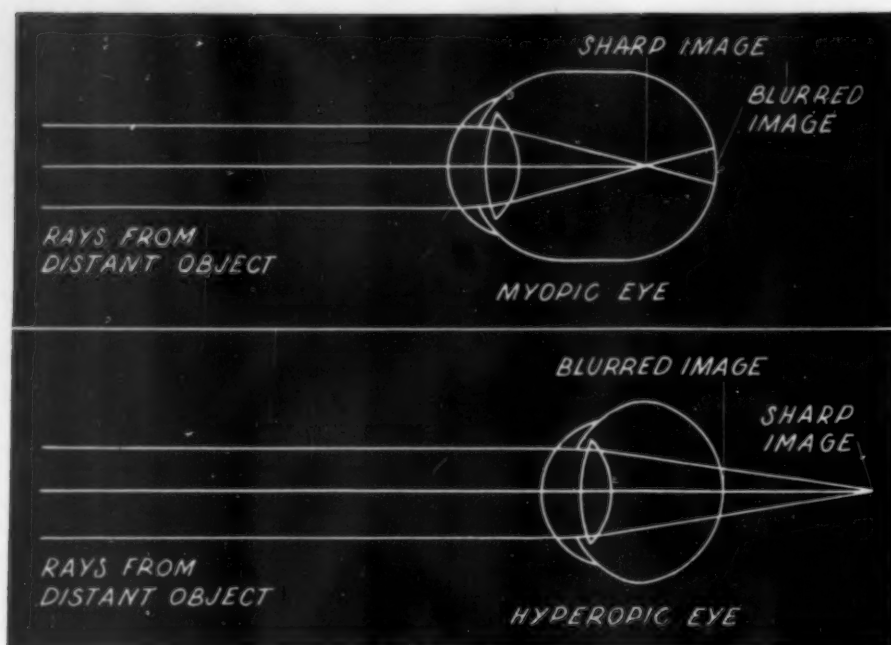
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HOW IT WORKS

In the nearsighted or myopic eye, the eyeball is elongated and light rays from an object brought to a focus in front of the retina, instead of exactly on the retina as shown in the top diagram. For distinct vision, objects must be brought nearer to the eye. The hyperopic or farsighted eye is smaller than normal and the parallel light rays from a distant object come to a focus beyond the retina, again blurring the image. Farsighted persons cannot see distant objects any more clearly than those with normal eyes. The term comes from the fact that the nearest point of clear vision must be farther from the eye than normal.

had astigmatism, he actually saw such lines which at times he put into his paintings.

While many artists painted what is seen with side or peripheral vision because that is the only kind of vision they had, others used this method deliberately. Sometimes this was used to achieve greater beauty or artistic value. This may have been true of the great French artist, Monet, who was the first impressionist. Dr. Mills regrets that there is no record of the exact condition of Monet's eyes. Whether or not he knew the optical laws of the relation of central and side vision, Monet used side vision accurately to depict "the expression of light, of air, of movement and of the unceasing changes" which are continually taking place in what Dr. Mills calls the realm of side vision. You can recognize this at once if you are familiar with Monet's paintings, particularly his "Impression. Soleil levant" which gave the name impressionism to this style of painting.

Monet was the first French artist who deliberately painted light and who understood that shadows are not just black or brown or blue, but actually combinations of colors in which any

tone may predominate under given conditions. In his interpretation of light, he drew inspiration from the English landscape painter, Turner.

Monet rarely used the normal central area of greatest visual clarity. His visual observations are otherwise so true that Dr. Mills thinks he probably was somewhat nearsighted, enough so to make easy the recognition of the values lying in side vision and "to give his landscapes the characteristic concubinage of blur, modification of color and persistence of essential lines and contours which are the essence alike of normal side vision and moderate myopia."

Turner's painting, "Rain, Steam and Speed," together with Rembrandt's "Landscape," Homer's "Canon Rock," and Israel's "The Day before Parting," are "nearly mathematically exact instances of correct visual areas, with equally correct subordination of the peripheral field," Dr. Mills states.

Great painters of the past have at times shown in their works that they appreciated the visual truths of central and side vision but only in certain works of Rembrandt, Renoir and Monet has Dr. Mills found artists consistently using central and side vision in the way that

the physician knows to be optically correct.

Some artists, it appears from Dr. Mills' discussion, have used side vision deliberately and with good effect because they appreciated its value and others have used it because it was the only kind of vision they had. Still others, however, have apparently used it merely because it was an easy way to create an effect that had become popular. Monet knew how to use it to good advantage. His deliberate change from the classic style of painting was a reflection of the revolution in many fields that followed the War of 1870.

But Monet set a style that was easy to follow and Dr. Mills accuses some of his less worthy followers of being racketeers.

"The ignorant and the unobserving, the immature and the lazy, the insane and the sensational, the primitivist and the idealist all use the qualities inherent in side vision for the expression of their essential emotions," Dr. Mills explains.

"The correct use of central and side vision, however, requires concentration, intelligent observation, technical mastery and emotional control, and that this combination of abilities is rare is one of the reasons that its perfect flowering has appeared spontaneously so seldom in the whole realm of art."

Side vision, unfortunately, is often used by artists "who aim merely for effects of mass, line, color or symbolism and particularly by those who are too lazy or ignorant to draw well," Dr. Mills charges.

"Such vision, in a literal sense, is the vision of objects badly seen, badly remembered, and often badly drawn, especially if there is an accompanying visual defect of severity, when color values also become modified.

Artistic Racketeering

"The picturization of objects seen with peripheral vision is a matter largely of mental interpretation, and this is the doorway through which all sorts of artistic excesses, perversions and daubery have been permitted to enter and to gain recognition as true forms of art.

"An informed public opinion should have recognized this debauchery as evidence of ocular or mental pathologic (diseased) state or, as much of it is, deliberate racketeering in art. . . . A careful analysis of recent baroque art should identify without much difficulty the artists who sincerely painted objects as they saw and idealized them with defective eyes and those who had other sources of motivation."

Dr. Mills recognizes that strict adherence to optical laws may not always be desirable in painting. However, he points out that, except for the great examples of historical and photographic likenesses in painting, the few paintings which are acclaimed by artists and laymen alike as outstanding and truly great works of art almost without exception show the normal relations of central and side vision.

A brighter future in art, freer from both the mischievous and the unavoidable use of side vision, is suggested by

another of Dr. Mills' comments. In the past eye defects were not so frequently recognized in either artists or laymen. On the continent, however, when impressionistic art was getting its start, no one wore eyeglasses unless forced to because of extreme visual defect. The present gradual spread of better visual hygiene will make the eye defects of the artist much less of a factor in his painting.

It may be that the age of cockeyed art is even now passing.

Science News Letter, February 6, 1937

ENGINEERING

Air Conditioners Challenged To Remove Bacteria from Air

NEW medical aids by air conditioning in the treatment of disease, houses insulated in winter by the use of ice roofs, scientific studies that seek the answer to the perplexing question, "What is a draft?", and research to improve the "liveliness" of air, were the high point topics coming up for discussion at the meeting of the American Society of Heating and Ventilating Engineers at St. Louis.

More and more the science of medicine and the profession of engineering are joining forces to combat one major avenue by which disease still spreads. Studies have revealed that hay fever and its kindred ailments yield to treatment in controlled air-conditioned rooms.

Now a new committee of the Society has been organized to investigate the purification of air in hospitals to prevent infection. A hospital, it is pointed out, goes to great lengths to sterilize its oper-

ating rooms, wards, instruments and the wearing apparel of the staff. Air conditioning for increased comfort to the patients and staff is now used in many places. But very few hospitals attempt to kill organisms in the air of the operating rooms or infectious wards for respiratory diseases. Yet science knows that radiation of specific wavelengths can kill bacteria floating about in air.

But the matter of turning this academic knowledge into engineering practice on an economical basis is a real and serious problem. While the heating and ventilating engineers make no claim to medical knowledge they do feel that their engineering experience will bring a more speedy solution to the problem.

Tied in with medicine also, in the field of physiology, is the major research problem of answering the simple question, "What is a draft?" or said another way, "When is a draft not a draft?"

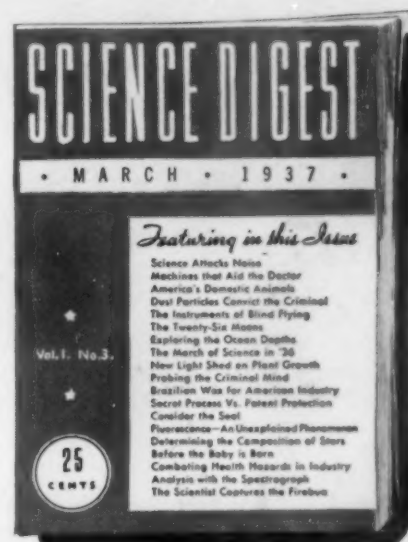
Already it has been found that one person's pleasing breeze is another person's discomforting draft. There is a sizable touch of physiological reaction tied up with the question of drafts. And it is a problem which air conditioned theaters, as only one example, have to worry about.

Few people, to illustrate, regard a mild flow of air on the face as a draft. Yet the same air flow on the back of the neck will bring wails of discomfort. Other people may have the same dislike for an air flow around their feet or legs.

On the answer to this question rests, in many ways, the future usefulness of forced ventilation—with either heating or cooling—which is the growing trend in making enclosed places more livable.

Science News Letter, February 6, 1937

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No One Medicine

FLOOD waters, bounding down the deforested slopes of the upper Ohio watersheds, gathering into national disaster in the gorged river-troughs downstream, have again germinated their crop of insistent demand for reforestation and regressing of the hills, from whence hath come not help but ruin. Get them all under permanent vegetation again, build little dams to hold the little waters upstream, and there will be no more great floods, declare many confident conservation-boosters.

Such prophecy may be over-bold, and in the end do the cause of conservation more harm than good. Great floods, like all great maladies, arise from a complex of causes and no one medicine is likely to be their only necessary cure. To some degree at least, endurance or avoidance may be the only practicable remedies.

For be it remembered that there were great floods in the rivers before ever the forests were stripped away from the hills. Floods on the Ohio are well recorded from early post-Revolutionary days, when clearing had not yet made any great impression on the primeval forest. And no reader of early American history is likely to forget the heroic march of George Rogers Clark's men, up to their armpits in icy

water, when they went to the surprise of the British garrison at Fort Vincennes and the conquest of the Northwest for the new nation.

Whatever we may do toward the mitigation of floods, therefore, we may as well expect that floods will still come. It is only decent (and available for the salvation of our self-respect) to suppose that human efforts really can mitigate them—prevent some altogether, perhaps, and at least diminish the volume and violence of others. But when we run into the situation that obtains at present, with rains continuing relentlessly to fall on soaked soil, with no more chance of sinking in than they would have on a tin roof, then obviously there must be run-off and river-rise.

What to do about it? Well, first, it would seem only elementary discretion to keep costly economic works away from flood-subject bottom lands, even though a disastrous one may come but once a generation. Then, if venturing into the chancy areas nevertheless looks profitable, it might be better to do so on a basis that will permit a quick get-away if River won't stay away from your door.

Finally, though trees and grass may not be able to prevent all the water from rolling off the hills, in the right places they can prevent the best soil of the hills from rolling off with the water. So go ahead and plant!

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ORNITHOLOGY

Studies Last Meals Of Long-Dead Pigeons

PASSENGER pigeons, once among the most abundant of American birds, have been an extinct species for years; yet what some of them ate for their last meals is accurately known. Miss Phoebe Knappen of the U. S. Biological Survey, a young woman born many years after the last wild passenger pigeon died, has studied the food habits of this now almost legendary bird.

The paradox of meals being still in existence though the birds that ate them have been dead for decades is explained by a study-method long used by the Biological Survey. When a bird of scientific interest is killed, the collector saves not only the skin, and sometimes the skeleton, but also the contents of its crop and gizzard.

Kept in bottles of preservative fluid, these last meals are carried to headquarters and there examined by specialists, to identify the kinds of insects, weed seeds, etc., on which the bird has

been feeding. This enables scientists to form an estimate of its usefulness (or otherwise) in relation to man and his crops and orchards.

Some of these preserved stomach-contents have been kept for many years. Among them Miss Knappen found the contents of eleven passenger pigeon stomachs, from four well-separated states. She made a careful examination of all of them.

Passenger pigeons, it developed, were predominantly vegetarians. A little over nine-tenths of the items found in the bottles belonged to the vegetable kingdom; just under one-tenth was of animal origin.

The largest single item was acorns. This accords well with a passage in Longfellow's "Evangeline," in which great clouds of the birds are described: "Darkening the sky in their flight, with naught in their craws but an acorn."

Second in importance, as passenger-pigeon food, were oak-galls, those curious swellings produced in leaves by the sting of a tiny, wasp-like insect. The fruits of the pokeberry, a common weed, with grains of wheat, ranked next.

The very great importance of acorns and oak-galls in the passenger-pigeon diet helps to explain how the birds vanished as the primeval forests of eastern North America were cleared. Not alone the guns of the hunters, but also the axes of the woodsmen, sent them on their last, unreturning journey.

Science News Letter, February 6, 1937

A new type of rail joint, invented by a Dutch engineer, is claimed to do away with shock or impact when pressure passes over it.

Surveying the state of Kentucky, archaeologists have in recent years recorded 688 Indian mounds, 162 ancient village sites, 170 cemeteries, 108 rock shelters, and 57 caves.

● RADIO

Feb. 9, 5:15 p.m., E.S.T.

FISH AS PETS—Fred Orsinger of the U. S. Bureau of Fisheries.

Feb. 16, 5:15 p.m., E.S.T.

NEW NAMES FOR OLD PLACES—S. W. Boggs, Department of State.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

Books

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WHICH OF 10 FAMOUS MAKES OF MEN'S SUITS are *Best Buys?*

ALMOST ALL ready-made clothing looks all right—when you buy it—but the man who is interested in saving money has to know more about a suit of clothes than what is apparent at the time of purchase. Textile experts working under the direction of Consumers Union took apart representative suits made by 10 nationally known manufacturers; tested the fabrics and linings; examined the workmanship in minute detail, and analyzed the other factors that mean long wear and satisfactory service. The results are published in the current issue of *Consumers Union Reports*, the monthly publication of a non-profit, nation-wide organization of consumers interested in getting the most for their money. This report on suits will tell you how much you should pay and what you should look for when you are buying a ready-made suit of clothes. It rates the different brands, *by name*, as "Best Buys," "Also Acceptable," and "Not Acceptable." Another report in the same issue tells you which of 16 leading brands of men's hose tested are most likely to wear longest.

How **CONSUMERS UNION REPORTS** save you money

Consumers Union Reports—telling you which brands of shoes tested will wear longest, which tires will give the most mileage per dollar, which automobiles and radios are the "best buys," and which brands of other products are the best values—can save you money and help you to buy intelligently. These *Reports*—rating products by name as "Best Buys," "Also Acceptable," and "Not Acceptable"—are published by Consumers Union of United States, a nation-wide organization of consumers whose chief purpose is to make accurate information about products—based on research by competent and unbiased technicians—available to its members at the lowest possible cost. Information on the labor conditions under which many products are made is also given in the *Reports*. Incorporated under the laws of New York State as a strictly non-profit organization, Consumers Union is sponsored by many prominent scientists, educators, journalists, labor and progressive leaders. Professor Colston E. Warne, of Amherst, is president of Consumers Union, Arthur Kallet, co-author of *100,000,000 Guinea Pigs*, is director and D. H. Palmer, physicist, is technical supervisor. The membership of

Consumers Union has grown in less than a year to more than 25,000—and is increasing, at the present time, at the rate of nearly 1,000 new members a week.

If you, too, want to make sure that you are getting the most for your money fill out and mail the membership application blank below—checking the month with which you wish your membership to begin. Principal subjects covered in past issues are given in the box at the right. The fee—which entitles you to a **YEARLY BUYING GUIDE** now in preparation as well as to a year's subscription to the *Reports*—is only \$3 a year—(\$1 a year for the abridged edition covering only the less expensive types of products). The *Reports*, beginning from the month checked will immediately be sent to you.

PRINCIPAL SUBJECTS IN PAST ISSUES OF CONSUMERS UNION REPORTS

MAY—Toilet Soaps, Grade A versus Grade B Milk, Breakfast Cereals
JUNE—Automobiles, Gasolines, Moth Preventives, Vegetable Seeds
JULY—Refrigerators, Bathing Suits, Used Cars, Motor Oils
AUG.—Oil Burners and Stokers, Black List of Drugs and Cosmetics, White Bread, Meat, Hosiery
SEPT.—Tires, Whiskies, Women's Coats, Shoes
OCT.—Men's Shirts, Gins, Electric Razors, Dentifrices, Anti-freeze
NOV.—1937 Autos, Radios, Toasters, Wines, Children's Shoes, Winter Oils
DEC.—Vacuum Cleaners, Fountain Pens, Electric Irons, Nose Drops
JAN.—Men's Suits, Children's Underwear, Cold Remedies, Shaving Creams

Also in the Current Issue of CONSUMERS UNION REPORTS

COLD REMEDIES

Hundreds of proprietary articles—ranging from gargles, cough drops, inhalants and ointments to pills, powders, syrups and "scientifically" formulated internal medicines—are being offered today as "remedies" or "cures" for colds. Which, if any, will do what is claimed for them? Are any of them capable of causing serious harm? These questions are answered in the current issue with names of specific products.



CHILDREN'S SLEEPING- AND UNDER-GARMENTS

Tested and examined by Consumers Union experts, 15 leading brands of children's cotton underwear are rated in the current issue as "Best Buys," "Also Acceptable," and "Not Acceptable." This report gives the opinions of child specialists on the comparative merits of cotton versus wool underwear, and describes the features which are desirable in children's undergarments. Leading brands of children's sleeping garments are also rated.



SHAVING CREAMS

Over 30 different brands of shaving creams (both the brush and brushless types) and shaving soaps were tested for Consumers Union members. Some of these brands will meet your shaving requirements for a year for as little as 15c—others will cost you ten to twenty times as much. If you want to economize on your shaving bill read this report.



Also discussed in the January Reports are MAPLE SYRUPS, HAND LOTIONS and other products, all rated by name.

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I hereby apply for membership in Consumers Union. I enclose:

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Please begin my membership with the issue.

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•First Glances at New Books

Aviation

YOUR WINGS—Assen Jordanoff—*Funk & Wagnalls*, 281 p., illus., \$2.50. A wartime pilot puts down the fundamentals of flying, in a grand book, beautifully illustrated. Every boy who wants to fly (and his father too) will want to read it; for it aims to include every conceivable thing that can be taught on flying by means of the written word or clear drawings. It should be a valuable aid to actual flight instruction.

Science News Letter, February 6, 1937

Microscopy

HUNTING WITH THE MICROSCOPE—Gaylord Johnson—*Leisure League*, 96 p., 25c. Alice went through a Looking Glass in a dream, and had a lot of interesting adventures. But any of us can go through the Object Glass of a microscope and have adventures still more interesting—and not dreams, at that. This new pamphlet in the Leisure League series tells how.

Science News Letter, February 6, 1937

Illuminating Engineering

TURNING NIGHT INTO DAY, THE STORY OF LIGHTING—M. Ilin—*Lippincott*, 119 p., illus., \$1. Trans. by Beatrice Kinkad. This is one of the few books in the field of popular science to come from U.S.S.R. The author has four other boy's books of science to his credit. Almost the first words deny that Thomas Edison invented the electric light; but that will only set Americans turning pages to find out who did. The original charcoal illustrations of the Russian edition lend interest.

Science News Letter, February 6, 1937

Archaeology

CULTURE OF SITES WHICH WERE OCCUPIED SHORTLY BEFORE THE ERUPTION OF SUNSET CRATER—J. C. McGregor—*Northern Arizona Society of Science and Art*, 52 p., illus., 60c.

Science News Letter, February 6, 1937

Agricultural Economics

INCOME IN AGRICULTURE 1929-1935—Robert F. Martin—*National Industrial Conference Board*, 168 p., illus., \$2.50. Economists have had the agricultural-income problem increasingly thrust upon them of late years, first by hard times in the commercial farming regions during an industrial boom period in the cities, then by the agrarian-political revolution that eventuated when

the urban boom finally collapsed, and emergency efforts by government to relieve and remedy the situation. The present treatise, though reflecting a certain degree of disapproval of recent efforts to help the farming industry, strives to be as objective as possible in its treatment of data admittedly incomplete.

Science News Letter, February 6, 1937

Physics

RADIOACTIVITÉ—Mme. Pierre Curie—*Hermann & Cie, Paris*, 563 p., illus., 150 fr. The world's greatest authority, whose recent death was a major loss to the world of science, here reviewed comprehensively the known knowledge on radioactivity, both natural and artificial. This work is recommended as a valuable reference book covering the field up to the end of 1935 for those who read scientific French.

Science News Letter, February 6, 1937

Astronomy

UNVEILING THE UNIVERSE, WHERE WE ARE AND WHAT WE ARE AS TOLD BY THE TELESCOPE & SPECTROSCOPE—*Research Publishers*, 135 p., illus., \$1 plus 12c in stamps. A curiously gotten up book, simply crammed with illustrations, giving compact masses of astronomical information, stories from the history of astronomy, brief accounts of modern telescopes and telescope makes, and much other pertinent matter. Larger and clearer type would make the book more easily readable; an index, too, might be helpful.

Science News Letter, February 6, 1937

Botany—Technology

THE MAHOGANY BOOK (2nd ed.)—George N. Lamb—*Mahogany Assn., Inc.*, 75 East Wacker Drive, Chicago, Ill., 80 p. Free to architects, furniture manufacturers and others interested in mahogany products, upon direct application to the Association at address given above. This pamphlet contains a really astonishing quantity of information about the best known and one of the most beautiful of tropical woods: its botany and distribution, its working and use, with many fine illustrations of mahogany, all the way from jungle tree to fine furniture and paneling.

Science News Letter, February 6, 1937

Physics

POLARISATION DIÉLECTRIQUE—G. Allard—*Hermann & Cie, Paris*, 28 p., 10fr.

Science News Letter, February 6, 1937

Physics

THE QUANTUM THEORY OF RADIATION—W. Heitler—*Oxford*, 252 p., \$6. A German theoretical physicist collects the literature of the new quantum mechanics into an excellent book for research physicists. Already the volume is appearing on the reference shelves of physics department libraries, and graduate students are reading it in connection with their courses.

Science News Letter, February 6, 1937

Chemistry

THE THERMOCHEMISTRY OF THE CHEMICAL SUBSTANCES—F. Russell Bichowsky and Frederick D. Rossini—*Reinhold*, 460 p., \$7. A complete revision of that section of the International Critical Tables dealing with the heats of formation of chemical substances. Carbon compounds containing more than two carbon atoms are excluded.

Science News Letter, February 6, 1937

Horology

TIME AND ITS MYSTERIES, SERIES I; FOUR LECTURES GIVEN ON THE JAMES ARTHUR FOUNDATION, NEW YORK UNIVERSITY—Robert A. Millikan, John C. Merriam, Harlow Shapley, and James H. Breasted—*New York University*, 102 p., illus., \$2. Four famous scientists cooperated in this unique lecture course in which, linked by a single topic, summaries of physics, history, astronomy and archaeology are presented. The popularly written lectures have been edited into a pleasing book.

Science News Letter, February 6, 1937

Physics

THÉORIE DU PASSAGE DES RAYONS COSMIQUES À TRAVERS LA MATIÈRE—J. Solomon—*Hermann & Cie, Paris*, 65 p., 18fr.

Science News Letter, February 6, 1937

Physics

ANALYSE DES MATIÈRES CRISTALLISÉES AU MOYEN DES RAYONS X—M. E. Nahmias—*Hermann & Cie, Paris*, 45 p., 15fr.

Science News Letter, February 6, 1937

Physics

LES RAYONS COSMIQUES, 47 p., 10fr; **TRANSMUTATIONS**, 83 p., 18fr.; **L'ÉTAT SOLIDE DE LA MATIÈRE**, 73 p., 18fr.—*Congrès International de Physique organisé par l'Union Internationale de Physique et la Physical Society—Hermann & Cie, Paris.*

Science News Letter, February 6, 1937